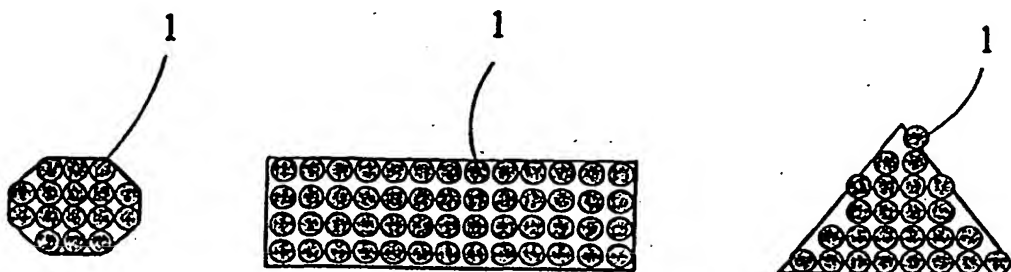




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : E01F 9/04, 9/08, C09D 5/00, 5/22	A1	(11) International Publication Number: WO 00/24969 (43) International Publication Date: 4 May 2000 (04.05.00)
(21) International Application Number: PCT/SE99/01681 (22) International Filing Date: 24 September 1999 (24.09.99) (30) Priority Data: 9803635-3 23 October 1998 (23.10.98) SE (71) Applicant (for all designated States except US): CLEANOSOL AB [SE/SE]; S-291 22 Kristianstad (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): STARLING, Hans [SE/SE]; Thorslundsgatan 10, S-262 33 Ängelholm (SE). (74) Agents: ANDERSSON, Per et al.; Albihns Patentbyrå Göteborg AB, P.O. Box 142, S-401 22 Göteborg (SE).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: SURFACE COVERING INTENDED TO BE USED ON MARKING COVERINGS FOR ROADS, PARKING AREAS AND THE LIKE

**(57) Abstract**

The present invention relates to a surface covering intended to be used on marking coverings for roads, parking areas and the like. It is characterized in that it comprises elastic particles that contain light-reflecting glass beads or ceramics (1).

BEST AVAILABLE COPY

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TC	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

5 **Title**

Surface covering intended to be used on marking coverings for roads, parking areas and the like

Technical field

10 The present invention relates to a surface covering that is intended to be used on marking coverings for roads, parking areas and the like, and which is designed to give optical directions. To give optical directions, the marking must be visible to the
15 road-users, especially drivers of motor vehicles, and give directions as to how to drive, cycle or walk, or where to park their vehicles.

Prior art

20 Road markings of this kind are used in every country where there is a sufficiently high level of traffic, especially vehicular traffic, and where the roads have a solid surface, made e.g. of asphalt or concrete. These road markings can have different
25 colours, but are generally white.

 Road markings are generally made with thermoplastic materials or similar materials, which are laid on the carriageway in the molten state. The marking material is mainly a paint, which can be either
30 water-based or solvent-based. However, multi-component systems, often called cold plastics, are also used. In addition, the marking material can be provided in the form of tapes. These tapes are supplied as "ready-made markings" and are fixed to the carriageway with the aid
35 of an adhesive layer applied to their underside. The markings can be in the form of continuous lines running along the edge of the road; parallel transverse stripes; continuous or other lines in the middle of the carriageway, or arrows indicating the driving

direction. Parking areas are also generally provided with such markings. Besides a binder, the marking materials often comprise fillers and light-reflecting beads that make the markings readily visible when light is shone on them in the dark.

These road marking materials can have very different structures and chemical compositions. Examples of such road marking materials are described in US Patent No. 3,253,146 and British Patent No. 2,043,673. All the known markings in use are wear-resistant to a certain extent, and after being laid, they can withstand the load to which they are subjected e.g. by the wheels of vehicles.

15 Technical problem

In the case of flat road markings, the light-reflecting glass beads lie below the surface for the greater part of their size. In dry weather, the light beam of a car impinges on the upper part of these glass beads, and the light is reflected back from the rear inside surface of the beads, so that the beads and the road marking can be easily seen. In damp weather or rain, however, a film or layer of water is formed on these beads, as a result of which the light is not reflected back but is deflected in the direction of the light beam. In such a case, the road marking cannot be seen well at all, and its efficiency in the dark in difficult conditions may be reduced by 80-90% in comparison with its efficiency under dry conditions. It is therefore desirable to raise the glass beads somehow above the surface, so that they lie above the layer of water. However, the problem with this solution is that the beads are then subject to excessive wear and tear, caused especially by studded tyres, while snowploughs - where used - can simply shave the projecting beads off. The situation is the same with the transverse stripes, where the road markings between the stripes are completely invisible in damp weather. If the beads are arranged on a firm

base and project up between these stripes, they are again quickly worn off by the wheels of vehicles, especially if these are fitted with studs, and they are shaved off by snowploughs.

5

The solution

The need to solve this problem has long been felt, and the aim of the present invention is therefore to provide a surface covering intended to be used on marking coverings for roads, parking areas and the like, characterized in that it consists of elastic particles comprising light-reflecting glass beads or ceramics.

The surface covering according to the invention suitably comprises one or more pigments, possibly including fluorescent and/or phosphorescent ones, and pigments that confer colour and covering ability on it.

Besides the glass beads or ceramics, the particles according to the invention suitably consist mainly of elastomers, such as natural rubber, styrene rubber, chloroprene rubber, ethylene propylene diene monomer (EPDM) rubber, nitrile rubber, fluorocarbon rubber, silicone rubber or polyurethane rubber, or of thermoplastic elastomers, such as styrene - isoprene - styrene (SIS) rubber, styrene - butadiene - styrene (SBS) rubber, ethylene - vinyl acetate copolymer (EVA), thermoplastic olefins, thermoplastic urethanes, polyesters, polyethers, polyamides, and/or mixtures of these.

Furthermore, the surface covering according to the invention suitably consists of particles forming a single particle layer (monolayer).

The particles according to the invention are suitably spherical, conical, rod-shaped, rhomboidal or cubic in shape.

The particles according to the invention should have a size of between 0.5 mm and 20 mm.

Description of the figures

The invention is described below in more detail with reference to the attached drawings, where

Fig. 1 shows diagrammatically three different
5 embodiments of the elastic particles according to the invention

Fig. 2 shows diagrammatically how the light is reflected and deflected by a road marking of the known type in dry and wet weather, and how the light is
10 reflected by a road marking in the case of a surface covering according to the invention in dry and wet weather, and

Fig. 3 shows the elastic particles applied between transverse stripes on a carriageway, in the unloaded
15 and the loaded state.

Detailed description

Fig. 1 shows a cross section of three embodiments of the elastic particles according to the present
20 invention. The particle on the left in the drawing is approximately spherical, that in the middle is rod-shaped, and the particle on the right is conical. The figure is only diagrammatic, and other embodiments are also possible.

25 As can be seen from Fig. 1, the particles are composed of a large number of beads 1, which are embedded in an elastic binder. This binder consists of some kind of elastomer, such as natural rubber, styrene rubber, chloroprene rubber, ethylene propylene
30 diene monomer (EPDM) rubber, nitrile rubber, fluorocarbon rubber, silicone rubber or polyurethane rubber, or of thermoplastic elastomers, such as styrene-isoprene-styrene (SIS) rubber, styrene-butadiene-styrene (SBS) rubber, ethylene vinyl
35 acetate (EVA) copolymer, thermoplastic olefins, thermoplastic urethanes, polyesters, polyethers, polyamides, and/or mixtures of these. The particles illustrated in Fig. 1 comprise glass beads throughout their mass, but it is also possible to apply the glass

beads only to their surface. In the embodiments illustrated, the glass beads are placed in a mould, and the elastomer mass is poured over them and then vulcanized. However, other manufacturing processes can also be used, in which the rubber mass is shaped first, and the glass beads are applied to its surface later. It is important to ensure, however, that the glass beads do not lie too close to one another, otherwise they risk being crushed during the deformation of the particle.

Fig. 2 shows four cases, of which the upper two refer to a bead-containing covering according to the prior art, while the lower two refer to coverings with the elastic particles according to the present invention.

In the upper two drawings, the glass beads 1 are applied to the surface of a road marking 2 according to the prior art. A beam of light 3, coming e.g. from the headlights of a car, impinges on the glass beads at an acute angle and is reflected back to the driver as a light beam 4, travelling along almost the same path as the beam 3 but in the opposite direction. The lower of these top two drawings shows the case when the beads 1 are covered by a layer of water 5. The beam 3 from the headlights is now deflected to form a beam 6 that is not reflected back to the driver. This means that the driver does not see this beam, and so the visibility of the road marking is greatly reduced.

The upper of the two lower drawings shows how the light is reflected when the particles according to the present invention are used on the road marking 2. The particles, which can have a height of 0.5-20 mm and comprise glass beads 1 either on their surface or distributed throughout their mass, are hit very favourably by the light beam 3, which is reflected back as a light beam 4. This part of the figure shows the situation in dry weather, while the lower drawing shows the case when there is a layer of water 5 lying

on the marking 2. In this case, the beads 1 project above the layer of water 5 and therefore reflect the light 3 back as a beam 4 in the same way as in the previous case when the road is dry.

5 Fig. 3 shows how the particles are applied to a road marking 2 that comprises transverse stripes 7. The elastic particles according to the present invention project somewhat above the stripes 7, and the marking is therefore very clearly seen.

10 The lower part of Fig. 3 shows how the elastic particles are pressed together under loading, exerted e.g. by the wheel 8 of a car. The second particle from the left is depressed, while the first particle from the right, which was depressed before, has
15 returned to its original state. In this way, the visibility of the marking is preserved, and the marking is not abraded in the same way as a hard, brittle marking. Even if e.g. a snowplough is driven over the covering, the particles according to the invention
20 yield and are pressed down, after which they rise again instead of being shaved off.

In addition to the glass beads that are embedded in or applied to the elastic material, the elastic particles can also comprise a pigment, which confers
25 colour and covering ability on them. The use of a pigment is part of the prior art and is often necessary if the glass beads or ceramics are to reflect light to a sufficient extent. Pigments also improve the visibility in daylight. Fluorescent and/or
30 phosphorescent pigments can also be used, but they are expensive, and - if employed in the customary road marking materials - they must be admixed to the whole material, which means that a large amount of such a pigment is needed. According to the present invention,
35 on the other hand, it is possible to admix the pigment only to the elastic particles, so that less pigment is needed, and surface coverings having these properties are therefore more economic. If required, friction compounds can also be added to the material.

The elastic particles according to the invention have been described here as a surface layer on conventional road markings. Single particle layers (monolayers) can be used, but there can also be a number of layers, or the particles can be spaced out more than they are when forming a continuous layer. It is also possible to lay these particles directly on the carriageway without any marking layer. A binder of some kind can then act as a covering layer or the elastic particles can be pressed into an unsolidified binding asphalt layer. It is also possible to lay the particles down in the form of various patterns, which can be done for example with the aid of special machines. To make the particles adhere to the surface of a customary road marking, they are applied to the latter before the road marking or the binder has set, or they are bound to a dry road marking with the aid of a primer or adhesive.

The invention is not limited to the embodiments described above but can instead be modified in various ways without violating the scope of the invention.

CLAIMS

5

1. Surface covering intended to be used on marking coverings for roads, parking areas and the like, characterized in that it consists of elastic particles, comprising light-reflecting glass beads or ceramics (1).

10

2. Surface covering according to Claim 1, characterized in that it also comprises fluorescent and/or phosphorescent pigments, together with pigments that provide colour and covering ability.

15

3. Surface covering according to Claim 1 or 2, characterized in that, besides the glass beads (1) or ceramics, the particles mostly consist of elastomers, such as natural rubber, styrene rubber, chloroprene rubber, ethylene propylene diene monomer (EPDM) rubber, nitrile rubber, fluorocarbon rubber, silicone rubber or polyurethane rubber, or of thermoplastic elastomers, such as styrene - isoprene - styrene (SIS) rubber, styrene - butadiene - styrene (SBS) rubber, ethylene vinyl acetate (EVA) copolymer, thermoplastic olefins, thermoplastic urethanes, polyesters, polyethers, polyamides, and/or mixtures of these substances.

20

25

4. Surface covering according to any one of Claims 1-3, characterized in that it consists of a monolayer or a multiple layer of particles.

30

5. Surface covering according to any one of Claims 1-4, characterized in that the particles are spherical, conical, rod-shaped, rhomboidal or cubic.

35

6. Surface covering according to any one of Claims 1-5, characterized in that the size of the particles is between 0.5 mm and 20 mm.

1/3

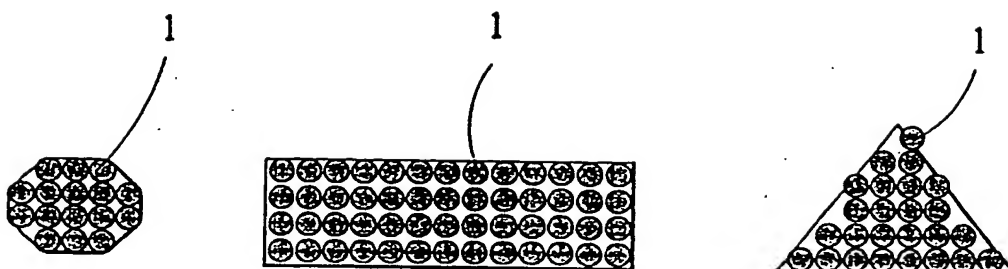
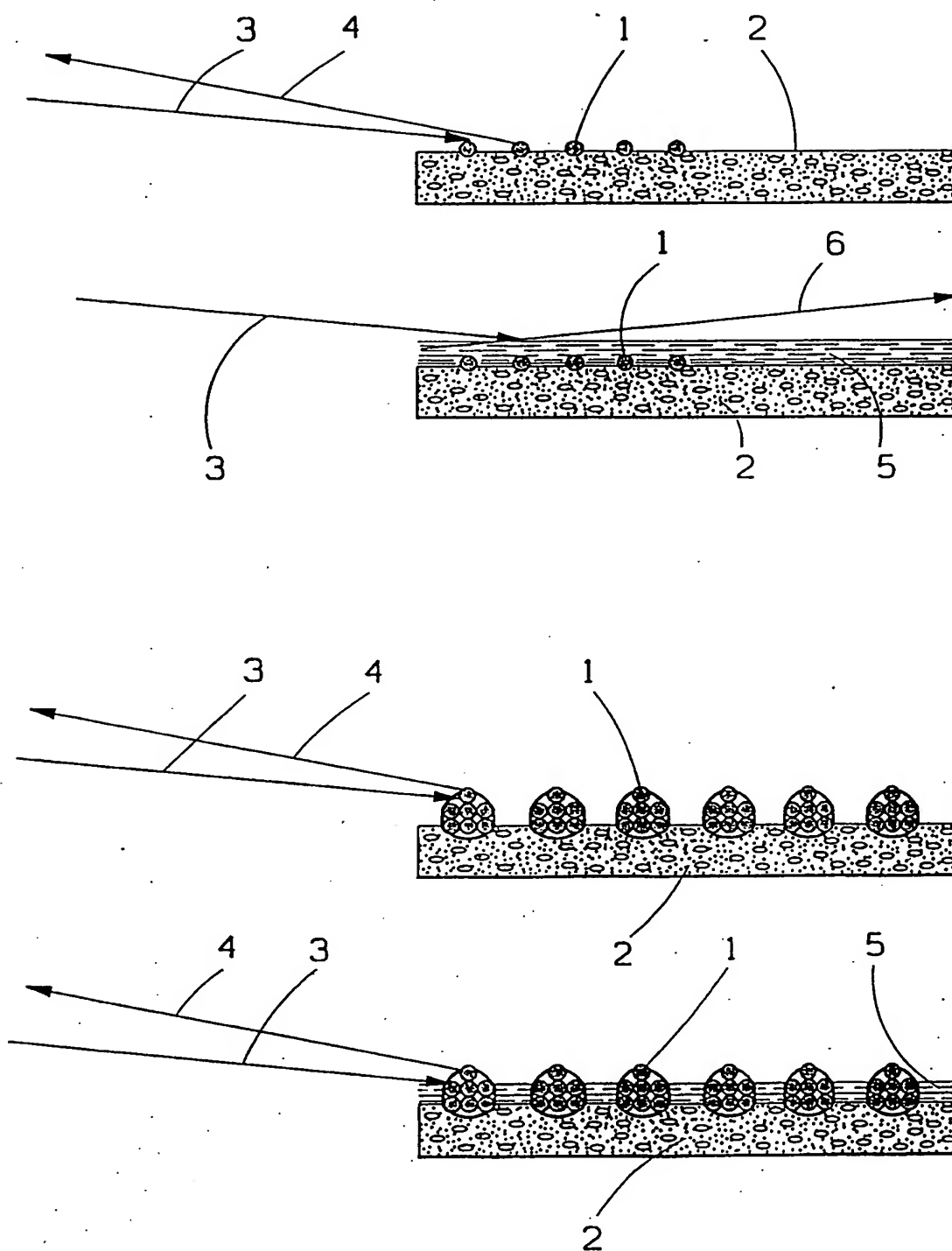


FIG.1

2/3

FIG.2

3/3

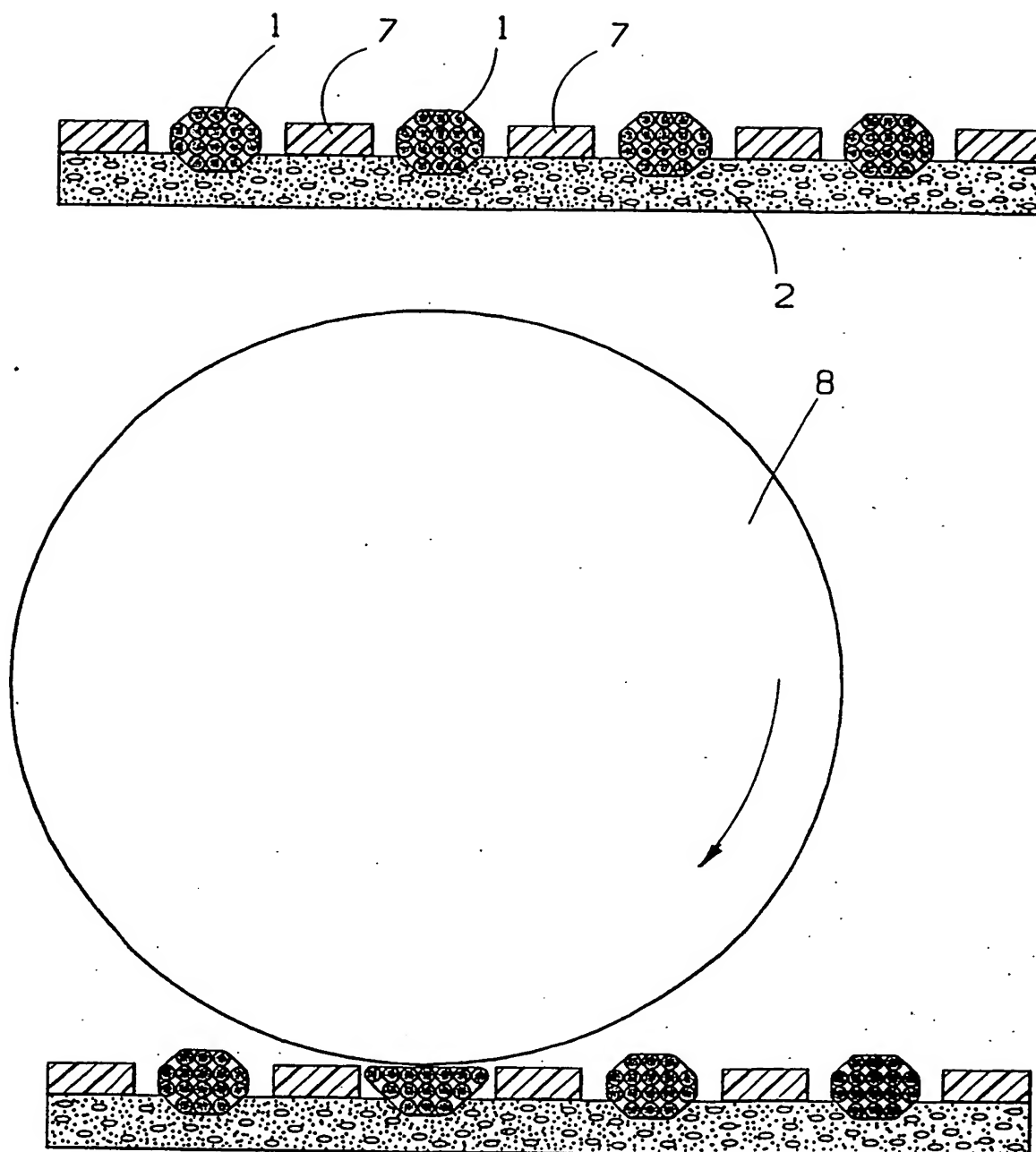


FIG. 3

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/01681

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E01F 9/04, E01F 9/08, C09D 5/00, C09D 5/22
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: C09D, E01C, E01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4815818 A (R.J. THOMAS), 28 March 1989 (28.03.89), column 3, line 52 - line 62; column 4, line 10 - line 42, abstract --	1-6
A	US 4573763 A (R.J. THOMAS), 4 March 1986 (04.03.86), abstract --	1-6
A	US 3253146 A (E.R. DE VRIES), 24 May 1966 (24.05.66), claim 1 -----	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

26 June 2000

Date of mailing of the international search report

18-02-2000

Name and mailing address of the ISA:
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer
Barbro Nilsson / MR
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/12/99

International application No.
PCT/SE 99/01681

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	4815818	A	28/03/89	CA	1262449 A	24/10/89
				US	4573763 A	04/03/86
US	4573763	A	04/03/86	CA	1262449 A	24/10/89
				US	4815818 A	28/03/89
US	3253146	A	24/05/66	NONE		

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.